—NOTICE—

The Fall Flower Show will be held September 4th. and 5th.

Look for Premium List in the June Number.

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IRIS HINTS NO. 2 — THE IRIS GARDEN

By S .S. Berry

We promised in an earlier article to give an account of the diverse blooming periods of some of the different tpes of Irises and how to select one's planting so as to include the longest possible period of bloom,—indeed, should one's garden be in a reasonably favored spot, to have Irises in flower every month or week in the year. In Southern California certainly this is a perfectly possible undertaking, especially if one's garden commands varying exposures in sun and shade.

To accompulish this in practice one must give consideration to eight groups of Irises—(1) the "main season" varieties, flowering abundantly and in a vast number of kinds through the month of April; (2) the early season Irises of various types, flowering with us mainly in February and March; (3) the late season sorts, flowering through May and sometimes into June; (4) the one summer-flowering species, **dichotoma;** (5) the winter-blooming Apogons (6) the varieties which have their principal season in the spring but often show a secondary period of florescence in fall or winter; (7) those with especially long periods of bloom; and (8) those varieties which bloom irregularly off and on through the year. This last category includes practically but one Iris of consequence—good old **Crimson King.** Let one plant his clumps of this in varying exposures and water them at different times, and the way the rich, dark purple flowers will unfurl to greet him at odd times and often when one has nothing else in flower and is least expecting them, is an unfailing source of surprise.

Let us begin the Iris year where it would seem that the procession logically starts—with the unfurling of the first delicate flower of some one of the **"marginata"** forms of **Iris unguicularis.** The **unguicularis** Irises,—too often called, and it would appear quite wrongly **"stylosa"**—are dainty sprites which bring us the breath of spring in the midst of winter even more than crocus and snowdrops do. Three of them indeed are indispensable, —the clear violet **marginata,** which is the earliest of the group and in a sunny position often commences flowering the first week in September, the white and gold **alba,** which comes into flower a little later, and the rich-toned **speciosa,** which has a shorter season but is the last of the tribe to flower. With these three Irises alone one has over half the calendar year accounted for! Still a few of the fall-blooming bearded Irises must certainly be added for variety at this time. Besides **Crimson King** the most reliable of these are probably two purple-and-tawny bicolor blends of Mr. Bliss's, **Dora Longdon** and **Syphax,** although **Mrs. Alan Grey** will likewise often favor with a few stems of her pretty lilac flowers. The newer **Cretan** (deep blue-purple), **Autumn King** (considerably lighter), and **Gold Imperial** (clear warm yellow) seem to be behaving in much the same useful way here in California and although a bit more expensive for the present ,are well worth owning. **Dora Longdon, Autumn King,** and **Gold Imperial,** when the season is right, will often bloom again in mid-winter, and then again at their normal time in the spring. Furthermore there are one or two rare little bulbous species, if you are so lucky as to be able to get hold of them,—**I. vartani** from Palestine, yielding its wee, sweet-scented flowers in November and December **I. alata** in December and January, and the small, but gorgeous **I. reticulata** in February.

But by February the early season Irises are coming in. In fact our common **I. albicans,** a plant the abundance of which often causes us to overlook its imense general utility, may get under way as early as January, and is soon joined by tall **Lady Lou,** beautiful **San Gabriel,** stately **mesopotamica,** and the orchid-like **japonica.** All four of these flower for weeks. Then come the dwarf "pumilas", and a little later the "intermediates", among the best of which are the white **Ingeborg** and **Ivorine,** the lavender **Diana** and **Turk,** and the yellow **Soledad** and **Yellow Hammer.** Some of the Junos and the wonderful Oncocyclus and Regelia species and their hybrids, not al-

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ways, alas, so very easy to obtain or to keep after one has got them, add interest, until along in March comes **Edith Cavell** and **Siwas** and others of the tall bearded group, as well as the fragile Asiatic **ensata** and the fairy-like **wattii.**

With so many things burgeoning glory in April the choice becomes almost infinitely wide, so only a few which yield flowers over a goodly period, such as the **San Gabriel** and **mesopotamica** already mentioned, the rather streaky but persistent **Alphonse Gerard,** the pale **Celeste,** and particularly some of the recent English **pallida** hybrids sent out by Messers. Perry and Dykes, notably **Mrs. Marion Cran, Ruby Perry, Aphrodite,** and **George Yeld,** need be mentioned here.

For late bloom in May we have such dependable bearded varieties as **Ambassadeur, Reverie, LaNeige, Dr. Bernice,** and **Virginia Moore,** as well as a number of the Apogons,—**aurea, foliosa, laevigata,** and the Japanese types.

The really dull time in our Iris garden must be the summer, for then we have little to rely upon save one curious species from China, **I. dichotoma,** and our old faithful **Crimson King.** But the flowers of **dichotoma,** though small and fugacious, keep coming for a very decent length of time, and so with good luck we shall manage to keep at least something on hand till **unguicularis marginata** rouses from its summer rest and recommences the pretty cycle.

Summing up briefly and leaving out of consideration all the very expensive ones, the following lists are suggested practical plantings for those interested in a complete Iris calendar.

First Choice List

I. unguicularis marginata
I. speciosa
Dora Longdon
Crimson King
I. albicans
I. japonica
San Gabriel
Soledad
I. mesopotamica
Alcazar
Celeste
Ambassadeur
I. aurea
a "Japanese"
I. dichotoma

Recommended Additions

I. unguicularis alba
Cretan
Syphax
Mrs. Alan Grey
Autumn King
Lday Lou
Orange Queen
Siwas
Edith Cavell
Souvenir de Mme. Gaudichau
La Neige
Virginia Moore

Varieties costing over $5 each are excluded from the lists.)

PENTSTEMON SPECTABILIS
(Abundant In Our Mountains.)

This is a distinct and handsome plant from California, of erect and graceful growth, a plant now blooming with me in a cool greenhouse being 5 feet in height. The handsome and deeply-toothed leaves are each 7 inches in length, Holly-like in appearance, and thus attracting attention even when the plant is not in bloom. The inflorescence is 18 inches long and about 6 inches wide, and the flowers which make this up and appear in clusters are of a pleasing mauve-purple. The plant in question was raised from freshly-imported seed, and, after growing in the open during the summer, was lifted and brought indoors in late autumn, as the flower-spikes were only then developing and I was not convinced as to its hardiness. In some respects this plant resembles the Chelone, its stout, round, and graceful stems and long leaves having much in common with this useful plant. The leaves and flowers, however, are quite distinct.—E. M. in Garden Illustrated.

A UNIQUE FLOWER SHOW

By Charles Francis Saunders, in Pasadena Star-News.

Pasadena's International Flower Show, at the Pasadena Young Women's Christian Association by the girl reserves, was a novel affair. This enterprising organization has for several years been in the habit of including in its activities an annual spring exhibition of California wild flowers, gathered and arranged by the girls with some expert assistance. This year, however, it was felt that in view of the growing interest throughout the country in wild flower conservation, induced by the disappearance of so many of our native plants from near centers of population, the usual wild flower show would be of questionable propriety.

It was a happy inspiration, therefore, to substitute for it an exhibition of cultivated flowers, cut from Pasadena and Altadena gardens and classified according to the lands to which they are native, each exhibit plainly tagged with the name of the plant and its country of origin. The exhibits were tastefully arranged on tables in the general reception room, backed by wall maps of the world and interspersed with geographical globes, by way of an additional international touch. Gardens were generously opened, and specimens of 166 different flowers and plants were collected, representing forty-five different foreign countries.

Visitors Surprised

The general effect was not only pleasing to the eye, but to the non-botanical visitors it was replete with educational surprises. Would you, for instance, have guessed that we owe the humble red geranium to far away South Africa, the French marigold to Mexico, the grass pinks and tulips of our grandmother's garden to pre-soviet Russia? Would you have suspected that fuchsias grow wild in Patagonia, and that from the Canary Islands are derived the magnificent cinerarias that glorify so many of our gardens?

Madagascar, Tibet, Iceland, Solomon Islands, Siberia, Tierra del Fuego, Natal, Abyssinia, Burma, Bolivia, Morocco—it is rather bewildering to realize that these and many more out-of-the- way corners of the earth have contributed beauty and fragrance to Pasadena's cultivated grounds, as have more familiar lands such as Mexico, Peru, Chile, Brazil, Australia, New Zealand, Japan, China, India, and virtually every country of Europe, to say nothing of our own country's contribution, as, for instance, the long-spurred columbines of the Rocky Mountain region, and the gay gaillardias and heucheras of our Southwest.

Golden State Blossoms

California was represented by a special table with specimens of native flowers obtained from private gardens of Pasadena and Altadena, among them such aristocrats as the Matilija poppy, the golden flowered Fremontia (whose name commemorates the famous "Pathfinder"), the rare Carpenteria of the Sierra foothills, and the remarkable Brodiaea, known as "firecracker flower," because of its scarlet tubular blossoms which droop in clusters like little bunches of firecrackers. Californians are at last coming to realize what European plant lovers learned nearly a century ago and have ever since been practicing, that our Pacific Coast natives take kindly to cultivation and add distinction to any garden.

A feature of especial interest in the exhibition was the presence of a number of plants famous for their literary, historical or mythological associations. Such plants, for instance, as the myrtle and true laurel of Greece, the papyrus of Egypt, the Italian cypress, the Syrian carob, the Japanese Nandina and cryptomeria, the Indian deodar, the Arabian khat, have so long been linked with the life of the human race in their respective lands, that literature is rich in allusions to them. Specimens of all these were in the show, and of others besides, such as the lovely Cantua buxifolia of Bolivia and Peru, whose flowers were the emblem of the ancient Incas, just as the fleur-de-lis was the badge of the Bourbon France.

Object of Show

So far as the writer knows, this International Flower Show of the Pasadena Girl Reserves is the first of its kind. It should be emphasized that its purpose was not to make a display of fine flowers. That is done, and worthily done, from time to time, by our Horticultural Society. The object of this international show was purely to give some hint, by grouping according to countries, of the debt that Pasadena gardens owe to the entire world. Of course, taking the year through, several more countries would claim recognition, and certainly a far greater number of varieties could have been assembled than were collected during the day or two given to the work before the opening; but to judge from the comments of the visitors who thronged the little show, the lesson went home. For this, due credit should be given to the system of labeling on ample tags of uniform character, bearing the names of both plants and countries in plain lettering. It is pleasant to know that in a sense we stay-at-

homes may have a trip around the world in Pasadena gardens, and learn during a single season, more of the botany of the whole world than we should be likely to acquire in the course of half a dozen world tours of the conventional sort.

HARDY BAMBOOS

Graceful Plants for Every Garden

There are some tropical Bamboos, but there are many kinds, natives of the colder regions of China and Japan, which are quite hardy in this country. Few gardens need be without a clump or two of Bamboos. These vary in height from 1 foot to 18 or 20 feet, giving a wide choice in foliage and habit, so that there are many positions for which Bamboos are suitable in garden borders, shrubberies, as lawn specimens and permanent evergreen screens, and by the water-side. A few groups, effectively placed, give quite a sub-tropical character to a garden They provide a delightful background for flowering plants the taller sorts being notably distinct and graceful in habit. Being evergreen,

Bamboos Are Particularly Useful and Attractive in Winter

When selecting positions for planting, choose places sheltered somewhat from cutting winds which sometimes come from north and east.

A good soil for Bamboos is a rich, moist loam. The soils to be avoided are hungry, dry ground and heavy water-logged land. Bamboos will thrive in nearly all cultivated garden ground which has been dug deeply and manured well. During dry spells of weather in summer Bamboos should be watered freely. A mulching of rotted manure is beneficial about the beginning of June, especially on light soils.

The Usual Method of Propagating is by Division

as, when growing under happy conditions, clumps of Bamboos increase rapidly in size. Seeds are not often available. The development of flowers, though seldom, generally means the end of the clump, as the production of seeds is usually followed by the death or disfigurement of the plants. It is interesting to note that when a species does flower it occurs in practically the whole of the plants of that particular Bamboo in all the gardens of the country.

When and What to Plant

September or early October and April or May are good planting months, but Bamboos are so well tended in nurseries that it is usually safe to plant at any time during the general planting season from September to May, when the ground and weather are suitable.

The Bamboo family is divided up into three genea by botanists: Arundinaria, Bambusa and Phyllostachys. The following are some of the best kinds, named in order of their value, to enable a would-be cultivator proposing to plant only two or three Bambos to chose those first on the list. Arundinaria nitida (10 to 15 feet), has gracefully arching canes and is useful as a lawn specimen. Does well in shade. Phyllostachys virdi-glaucescens (12 to 20 feet), of elegant and graceful habit, is very hardy and free in growth. P. nigra (10 to 15 feet), with distinct black canes, has dark shining green foliage, and is pretty in a clump. A. japonica or Metake (10 to 20 feet), large shining dark green leaves, is the best Bamboo for massing as a screen and planting in shrubberies for shelter. A. auricoma (2 to 3 feet), attractive green and golden striped foliage; very effective in winter. A. Fortunei (2 to 3 feet), leaves striped white, pretty in the front of borders. A. fastuosa (20 to 25 feet), the tallest of all hardy Bamboos ;a strong grower and very ornamental. A. palmata (6 to 12 feet), large leaves 1 foot or more long and 3 inches wide; spreads freely. A. Ragamouski (2 to 3 feet), very large leaves; a distinct dwarf species. A. vagans or pygmaea (1 to 1½ feet), the smallest of the dwarf Bamboos; very useful as a carpet or undergrowth.—Popular Gardening.

THE CHINESE LANTERN

There are two sorts of Physalis: Francheti, which is the better and more common, and Alkekengi. Physalis is called Winter Cherry, Cape Gooseberry or Chinese Lantern. It has become naturalized in South Africa, and is now grown in Madeira and the South of France. It is not known as it should be among gardeners in this country. The plants are perennials and are conspicuous for their lovely orange-colored covering, which encloses a Cherry-like fruit. Their calyces hang on rather slender stems, which should be supported, as they make a brilliant show in autumn. When cut, before being soiled by the weather, the shoots last for months for winter decorations. Chinese Lantern can easily be raised from seeds in the open during April and planted out during autumn, or the roots may be divided in spring. A warm, fairly light soil suits Physalis best, giving a covering of manure or leafmould in autumn.—H. H. Belton, in Popular Gardening.

SOLANUMS DROPPING THEIR LEAVES

These drop their leaves from various causes, including drought, insect attacks, such as red spider and aphides, removal from a close, warm situation to a draughty one. In short, sudden checks at any time will cause the leaves to fall.

The May and June Gardens

REPOTTING FERNS

A mixture of rough loam, rough peat, and plenty of sand suits all Ferns. In potting, the finest of the mixture should never be put at the bottom. It must be on the top if anywhere, but very fine material should not be used. What soil requires to be put at the bottom should be placed carefully over the crocks and be firmly rammed down before the plant is put in, and, when space is limited between the old ball and the sides of the pot, it may be a difficult matter to get rough pieces filled in, but they should be pressed firmly down with a piece of stick, and care should be taken that no little vacancies are left. After potting one thorough watering at the root should be given and the soil will not become dry again for some days. After one watering, I, however, mean more than once filling the space left for this purpose. After the first quantity has soaked in, another should be given, and if it is thought that this may not be enough to wet all parts of the soil, more may be applied. Once the whole of the material has become thoroughly wet, the roots are sure to go on well, but if only the surface soil is wetted growth will neither begin nor continue satisfactorily.

Ferns whose fronds have become ragged and discolored should be cut down to the crown. Plants which are not to be repotted should be treated in this way before they have begun to grow, and those which are repotted should be cut over when that operation is being performed. It is astonishing how much Ferns may be benefited by weak doses of liquid manure given twice a week or so. Soot-water and cow manure water are both good, and when these are used—especially in the case of plants which have not been repotted—the result is most satisfactory—Gardening Illustrated.

THE AGERATUMS

Ageratums are old time garden flowers that are again coming into favor. This is due partly, no doubt, to the introduction of improved kinds which are of special value for edging purposes. The Ageratum has small blue flowers which keep in good condition for a long time. Moreover, the Ageratum is one of the plants which luxuriate in the hot rays of the summer sun. . It will stand considerable drought, and is hardy enough not to be killed by early frosts.

THE GARDEN

By Walter Birch.

To continue about the growing of dahlias (which was cut short by the printer last month) remember that as soon as growth of the plants is well started, they will need a uniform and abundant supply of water, to be regulated according to the particular kind of soil your dahlia bed is composed of. Heavy soils will need less moisture and more cultivation, and light well drained soils more water and less cultivation. Both soils will be much benefitted by a good mulch of strawy manure. Irrigation of furrow or basin round plant is recommended, with an occasional spraying of the plants to keep them clean.

After every irrigation the ground should be cultivated to keep down weeds, conserve moisture and in heavy soils to prevent baking. When the plants are pretty well grown, great care must be taken not to damage the surface roots by working the ground close to the plant. An occasional application of bone meal or any good commercial fertilizer in small quantities during budding and flowering time will be beneficial. This should be carefully worked into the soil where the root system can take it up.

The dahlia is usually pretty free from insect pests and disease, thrips and aphis can both be controlled by applications of Nico-Spray used in the proportion of a tablespoonful of spray to a pint of water. Thrips are small insects which usually attack the plants early in the season, causing the leaves to curl and giving the whole plant a backward and sickly appearance. An occasional spraying with Qua-Sul, a teaspoonful to a gallon of water will prevent mildew and will not hurt the blooms.

May and possibly the first week in June is the last call for the satisfactory planting of gladioli bulbs, which with proper care will bloom in ten weeks to three months from time of planting. They do well in any good garden soil planted either in rows or groups, and should have a fairly sunny location. Plant bulbs about five inches deep and about eight inches apart. The gladioli also requires a good water supply and liberal fertilizing. It being now near the end of the season for bulbs, a good well blended mixture should be satisfactory at this time. June is still good planting time for Chrysanthemums. Procure

Continued on Page 10

Patronize the Garden Advertisers.

The California Garden

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Alfred D. Robinson
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EDITORIAL

Luther Burbank, like other mortals, has reached the end of a most colorful life, and with him has departed an ever springing fount of press misrepresentation. Possibly no human has had printed more absurdities connected with his name. It is not possible that these absurdities originated with Burbank, but no doubt they were the children of writers whose knowledge of vegetable life was practically nil however, they erected for him a popular fame that has made his name a thing wherewith to conjure, and today the western world believes that the highest compliment a floral worker can receive is to be compared to Burbank in even a small measure. The glamour surrounding the name of Burbank makes impossible any proper estimate of his work, but Time the great sorter will show just the worth of his introductions. Even if all his introductions are discarded within the next score of years, that will not lessen the fact, that because Burbank lived, a great influence and a good one towards gardening in Western America was broadcasted, and it is pleasant to think that as he died the four representative articles about him appeared in the Saturday Evening Post.

We have been reading with much interest a report of the experiments of a certain Bernard Field, back in Massachusetts, which seem to imply that the methods of soil fertilization generally employed are all wrong, and that plants feed through the leaves rather than the roots. This is not mere theory but is backed up by demonstrations of plants grown in pure baked sand and stimulated or fed by radio active ore backed by an electrically stirred tank of ammonia, etc. We are not electrically minded and cannot follow the process much less relay it intelligently, but gather that the feeding element is let loose in the atmosphere and the plants get it through their leaves. The report, which appears in the May 8 issue of The Florists Exchange, is too detailed to be dismissed as another fake, and this idea of tickling up plants by electricity and radium has always been popular. Early in our plant experiments a doctor contrived to make us sow seed in a box at the base of which ran wires connecting plates of zinc and copper, and our august Government has recently published an exhaustive report on the general futility of applying electricity to growing crops through wires stretched across them. We also have had our attention called to radium ore, in fact used it with no apparent results. Let us confess we don't think there should have been any, because of an utter lack of idea as to what we were trying to do beyond make plants grow faster than normal. Fertilizing is a general and smelly business, practised because no other satisfactory method is at hand, but it does not appear unreasonable that in our atmosphere may be all the elements of plant growth, if they can be made available, and if instead of forking in the odoriferous manure we can just turn on an electric switch this may yet make of us a race of gardeners.

THE QUESTION BOX

Question: I notice in your last issue you state that the complete files of the magazine can be obtained. How many years back does the magazine run and what is the cost of the complete files?—I. I. J.

Answer: 1909. Ten cents per copy, which makes the complete files cost in the neighborhood of $16.00.

Question: Can you tell me the name of that tobacco stem mixture Mr. Gallup spoke of at the May meeting?—H. H.

Answer: "Fertobac.

Question: Where can the bulbs of tigridia pavonia, the Mexican Peacock Tiger Iris be obtained, and how much do they cost?—H. J. C.

Answer: R. M. Crocket & Co., Cranford, N. J., 25 cents each, $2.50 per dozen, or $18.00 per hundred.

THE ANNUAL MEETING

The annual meeting of the San Diego Floral Association will be held on the evening of Tuesday, June 15th at the Floral Home in Balboa Park.

The election of officers for the coming year will take place. All members are urged to attend. The meeting will open promutly at 7:30.

REGULAR MONTHLY MEETING FOR MAY

The regular monthly meeting for the San Diego Floral Association was held on the evening of Tuesday, May 18th, at the Floral Home in Balboa Park. The subject for the evening was "Annuals and Perennials."

Mr. Perry Gallup of the Art Flower Shop spoke on annuals, giving many helpful pieces of information, culled from his long experience at growing flowers here in San Diego.

Mr. Walter Birch then gave an interesting talk on the most popular of the perennials, discussing their likes and dislikes, when to plant, etc.

Both speakers urged the use of tobacco stems as a mulch around the plants, and explained that not only is it a plant food, supplying humus to the soil, but acts as an insecticide as well; then, too, the fact that it will not burn the plants no matter how thickly applied, but will retain moisture against the plant roots, makes it an ideal surface dressing.

After the speakers, coffee and cakes were served by the House Committee and a pleasant social hour was enjoyed by all.

JUNE WEATHER IN SAN DIEGO CALIFORNIA

Dean Blake.

With June our dry season begins. In fact, the outstanding feature of the month is the absence of stormy, windy weather, so that little or no rain may be expected. Monthly amounts of more than a tenth of an inch have chanced to fall but 11 times since 1850.

In the great enclosed valleys of the interior, high temperatures become a daily occurrence, with the result that along the coast night and morning cloudiness begins. Consequently, the daily range in temperature in San Diego is small, and the change from day to day little. A reading below 50 degrees has never been made during the month, but 90 degrees has been exceeded 6 times in the last 54 years.

Since the record began in 1872, the highest temperature was 94 and the lowest 50. The daily mean temperature for the period is 65 degrees; the mean maximum, 69; the mean minimum, 59. The greatest rainfall was 0.31 inches in 1884; the least 0.00 inches in many years. A wind over 30 miles per hour has never been registered. The sun shines on the average about 62 per cent of the time possible.

IS IT TIME FOR ME TO PAY?

So many people call up or write in to the Secretary to ask this question, and no doubt many others would like to keep track of their dues and have the satisfaction of knowing when it was time to pay them. This information is printed every month on the cover of this magazine, and if you will look right now you will see that after your name is a letter—either "M", if you are a member of the San Diego Floral Association as well as a subscriber or "S" if you are a subscriber only. After the "M" or "S", as the case may be, you will find figures as for example "6-26" which means that John Doe's subscription will expire the 6th month of 1926. If you should find that the figures after your name read "6-25" it would mean that you are eleven months behind in the payment of your dues, and a check made out to the San Diego Floral Association mailed to Box No. 323, would be the answer.

Do it now!

A SPRAY FOR RED SPIDER

Bird Forrest, well known florist of Waxahachie. Texas, sends the following:

"Now being the time when red spider increases by the thousands, we are offering through the Southern Florist our formula for cleaning them out. Using a druggist's graduated glass measure, marked in ounces, for both powder and liquid:

"One pint of white sugar in the bucket first; then 9 ounces arsenate of lead; stir thoroughly. Add enough hot (but not boiling) water to make a thick paste, and stir well. Then add enough hot water to make a gallon (including what was used first). Use 8 ounces of this mixture to the gallon of water, and apply with compressed air sprayer. The heavier the pressure the better the spray. Walking about the average speed of a lazy man will give the right amount on the plants.

"We use this on anything that spider infests. It is sure, and harmless to plants. We find it easier not to spray all the carnations at regular intervals, but to watch for spider when we are cutting flowers, and if we see even one spider to mark the spot and spray three or four feet around it.

"If carnation plants are free of infestation and healthy, the spray will not be visible on them. If badly infested it is necessary to thoroughly wet the plants, and after the spiders have disappeared (three or four days) wash the plants off with a gentle spray. We find this good for sweet peas also, lightly spraying the lower part of the vines (where spider first start) every ten or twelve days.

"As the stock mixture settles rapidly, it is necessary to stir well and dip out quickly what is wanted; also to shake the sprayer every few steps.

"Don't guess at the measurements if you want satisfactory results. We trust this will be of some benefit to some brother florist."—From Southern Florist.

DAHLIAS

Should not be planted before April in San Diego County. It is possible to plant them earlier, also to leave them in the ground and cut good flowers. From a standpoint of good growing it is inadvisable as clumps left over are very apt to rot, or throw many shoots making a bushy weak growth far from satisfactory. Divisions planted too early are very apt to rot before getting started.

As the majority of the dahlias have been planted before this article comes to your attention, I shall merely mention some of the preliminary steps that should or should have been taken in preparation.

The soil should have been given a turning over about two weeks before planting. At planting time a stake should have been driven and the tuber planted at its base so that the sprout was about 4 inches under the ground. If this stake has not been driven it should be placed as son as possible, being careful not to break the tuber when putting the stake in the ground. No water should be applied until the shoot comes through and then only enough water to keep the soil moist—not soggy. As the top growth continues frequent syringing with cold water and strong presure will keep the foliage clean and prevent many insect troubles.

After four or five pairs of leaves have been developed the top should be nipped out. This will give better flowers and longer stems from the lateral growths. It will be at the sacrifice of the first bloom, but is well worth it. If you must have that first bloom pinch out all laterals above the fourth pair of leaves as they develop and when your terminal bloom is ready pick it with a stem all the way down to the first pair of laterals you have allowed to develop.

When bloom starts cultivation ends. A good mulch should then be spread and added to as it is packed down. If stable manure is not used for this purpose, commercial fertilizer should be applied to the mulch that the water may carry the nutrition to the feeding roots which are now at the surface of the soil.

For Pest Control

Thrip—Black Leaf 40 (as per directions).

Mildew—Powdered Sulphur (dusted on infected portions).

Cucumber Beetle and Eating Insects—Arsenate of Lead.

Borers—Use a long, sharp pointed, steel wire probe and by running it through the stalk puncture the borer.

Fertilizers

Tankage.

Bone Meal—Steamed.

Potash; Phosphoric Acid—These two may be lightly applied and raked into the soil.

If you planted your dahlias before the last heavy rain and some have not come through yet, better dig them up. Chances are they have rotted.

R. F. CUSHMAN

THE WHATISIT

Procure an ordinary hair-curler, with wooden handles, at any ten-cent store. Remove the rivet connecting the two handles. Discard the one containing the rod, and flatten about one and a half inch of the end of the other and you have a tool that will recommend itself to any worker among seedlings. There is no tool made to compare with it for the worker among seedling plants. There are two sizes to be obtained.—Western Florist.

Glads - Dahlias

No more dormant bulbs for sale this season.

Now is the time to visit our gardens, see the glorious Glads in bloom and make your selection for next season's planting.

Call at the home gardens at
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CUSHMAN GLAD—DAHLIA GARDENS

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National City, Calif.

P. O. Address Route 1, Box 166

Three Suggestions for Balboa Park

Now that all danger of ceding a part of Balboa Park for the State College grounds seems to have blown over, it is timely to consider some of the problems of future park improvement. That we have a tremendous asset in our centrally situated fourteen hundred acres of park land is acknowledged by all who visit San Diego. Probably no other city in the country has such a glorious opportunity to build a beautiful and useful center. The work done in preparation for the Exposition of 1915-16 has made the western portion of Balboa Park one of the beauty spots of America. The magnificent combination of art and nature, of architecture and landscaping, attract all lovers of beauty;—and the varied attractions of the park,—the organ, the zoo, the art gallery, the various museums, the rose garden and the other special or seasonal gardens,—make even the most hurried florist feel that the park is the one thing in the city that cannot be missed.

There are, in the easterly portion, several hundred acres of almost undeveloped land, and it is opportune to make the plans for their future development now. Some day the funds will be available for doing the work, and in the meanwhile there will be far less temptation for and less probability of outside interests securing portions of park land. Too much has already been alienated from strictly park purposes;—and if an accounting can be made of the requirements for the future developments, the danger of further encroachment will be lessened.

It is the purpose of this article to call attention to certain improvements which the writer feels would be of especial advantage to the park and its public. These suggestions are not original with him, but seem to be of sufficient worth to justify the Floral Associations presenting them to the Park Board with the request that they be considered in the plans for the further development of Balboa Park.

First: A Botanic Garden of California Flora

There is nowhere in California, I believe, a public garden of native plants, properly labelled and described, where they may be examined and studied by amateurs, nurserymen and scientists. Such a garden would be of tremendous interest, showing possibilities, undreamed of now, for using our native shrubs and trees in domestic landscape architecture. Very few home grounds today contain more than a few scattered specimens of native plants. Monterey cypress is, of course, much used, and Monterey pines are not uncommon. Occasionally one finds a redwood, a Lawson cypress or a California holly;—a few more gardens have the matilija poppy;—but other than these the native plants are seldom seen. Pepper trees are everywhere, but who plants live oaks? The libocedrus decurrens (Incense cedar) is very rare in the city, yet its native home is in the Cuyamaca mountains, and a more majestic tree is impossible to find. A dozen or more varieties of ceanothus (wild lilac) will grow in San Diego, and they should be in every large garden. What could be lovelier than a large group of these, spaced far enough apart to allow each to develop to its best For mass effects or for individual planting there are few things finer than our rhus integrifolia (lemonade berry), rhamnus californica and ilicifolia, or cerocarpus baetulifolia, and they are perfectly adapted to local conditions. Then, too, there are the perennials,—many of them with gorgeous blooms and good foliage, most useful as border plants and in the cutting garden, plants that do not demand the pampering required by their exotic cousins.

Such a botanic garden would be of the greatest use to owners of small homes desirous of beautifying their yards and at the same time of getting away from the conventions and rules laid down by the nurserymen. And such a botanic garden should be in itself a thing of exquisite beauty. A scientifically arranged collection of growing trees, shrubs and herbaceous plants need not sacrifice a bit of charm to science. Those who know the Arnold Arboretum in Boston—or Kew Gardens near London, can vouch for that; and all who have visited any of the great Tropical Botanical Gardens (at Cienfuegos in Cuba, Port o' Spain in Trinidad or Batavia in Java) have seen marvellously lovely gardens with not the slightest lessening of their value to the student.

England today, I believe, uses more native California plants than California herself. Balboa Park could perform a really great service by educating its visitors to the value and beauty of our flora.

Second: A Botanic Garden of Succulent Plants

In various parts of the world there have been brought together collections of succulent plants—those plants which are commonly designated as "cactus". As is generally known, succulent plants thrive in arid regions and many varieties can subsist on very meagre diet. Given a moderate amount of water, fairly good soil, and a little bit of care, and they prove to be wonderfully grateful and responsive. Their infinite variety of form, color, texture, habit of growth; a certain romantic charm which seems always to have been attached to them as distinct from all other types

of vegetation; their hardiness against all manner of adversity; these make them among the most interesting of all plants. Most varieties have conspicuous flowers, many of a gorgeousness or of a delicacy unsurpassed in the whole word of flowers. They appeal as much to the the amateur as to the trained botanist.

No class of plants is better suited to the collector. Nearly all can be grown from cuttings, they stand transportation for long distances without danger of dying, and they are well adapted to hybridization. And the variety is endless. Collect for years and there is no possibility of making the collection complete.

Succulents seem best adapted to planting in rock gardens,—and a few acres of rock garden in Balboa Park so planted would be a thing to marvel at. With such a garden we would have something unique in America. And its cost would be ridiculously low compared to that of any other sort of park development. Imagine the enthusiasm of a visitor walking through such a rock garden, his path terminating in a lath house filled with cereus and cereocactus in bloom.

Third: A lath house with a comprehensive collection of begonias and similar semi-shade loving plants. Mr. A. D. Robinson, authority on begonias, states that probably no climate in the world is better than ours for growing his specialty. Grown under lath work, they develop to a point undreamed of elsewhere. And so Balboa Park should have a real lath house—low rambling disconnected,—housing begonias and ferns and the myriad of exotics, tropical and semi-tropical plants, that cannot stand the direct rays of the sun in this land of little humidity.

Such a lath house, properly planned, would be the crowning glory of our park. Those who know Mr. Robinson's own lath house, on Point Loma, can visualize another a dozen or fifty times as great in area, and can imagine the gorgeousness of it. It would be expensive to build and would require constant care to keep it in condition; but it would be worth all the care and money spent to bring it to perfection.

Architecturally it (the actual building) should be as inconspicuous as possible,—the ideal lath house should so be built that the structure itself would not show at all. Think of the beauty of such a collection of lathworks rambling over a few acres, filled with blooming begonias, with ferns and palms and vines, with gloxinias and streptocarpus, with lilacs and primulas and all the rest the rockeries and pools and aviaries the lath-work draped with wisteria and all manner of vines; and scattered among the houses, trees with shady seats, and shrubbery and fountains and open courts of bedding plants! Why cannot some philanthropic citizen be induced to make it a real fairyland instead of a thing of dreams. We have the space in Balboa Park. We have the man, Mr. Robinson who knows better than anyone else in the world now to do it. Perhaps some time the money will appear from somewhere.

Having submitted, in brief form, these three suggestions, the writer respectfully suggests to the San Diego Floral Association that it make an effort to co-operate with the Park Board in carrying out any or all of the three that seem desirable to that body.

WALTER S. MERRILL.

THE GARDEN

Continued from Page 5

strong, healthy rooted cuttings either balled or in pots, plant in well fertilized soil one foot apart, water liberally and cultivate freely, doing the necessary disbudding and pinching back of plants, and you will be rewarded by a plentiful supply of flowers for garden and indoor decoration during the late summer and fall. You can still set out strong balled plants of quite a few annuals and perennials that will give a good account of themselves during the summer.

Asters and zinnias are strictly in season, as well as coreopsis and gaillardias, also marigolds and petunias. Give the latter plenty of room as it branches and blooms profusely. Penstemons can also go in and seeds of many annuals and perennials for fall and spring blooming.

A WILD FLOWER SHOW

"Hark, hark, hear the Dogwoods bark!"
Pussy-willows have come to town,
Some by river, some by rill,
Each in a velvet gown.

Adder-tongues run in and out
To see Spring-beauty spring;
Creeping Jenny creeps about,
While all the Heatherbells ring.

Baby-blue-eyes blink and wink,
While Monkey flowers grin
To see Johnny-jump-up jump,
When Buttercup butts in.

The Baytree bays the Moon-
Flower; Trumps and Bugles toot,
Dandelions lie on the lawn,
Blazing and Shooting Stars shoot.

Swordlily and Hoarhounds hurry
To join the Foxglove chase,
Bouncing Bet in a flurry
Bounces right into the race.

Poppies are popping to go,
Larkspur is spurring the larks,
Angel's-horn begins to blow—
No wonder the Dogwood barks!

E. S. RYAN.

Any other dog would howl.—Gray Goose.

Patronize the Garden Advertisers.

LATH HOUSE MATTERS

By Alfred D. Robinson.

It is now plain that this will be an exceptionally good year in the lath house, that April rain was a lifesaver, even if the prophecies of more later all fizzled. I have been asked so many things relative to my remarks last month as to the use of rain water that I have forgotten most of them; save that their general tenor was, if certain substitutes were not acceptable, so I take this opportunity to say that I don't think they are, certainly not distilled water. It is amazing how many devices and nostrums for making soft water out of hard have come to my notice since I have been bitten with this rainwater bug, and as I write the latest in pamphlet form stares at me from my desk, it is a filter stuffed with radium ore which is said to jazz the water passing through it so that men and plants thrive extraordinarly when drinking it. The party who left this literature looked me in the eye and enumerated as this filters' meat every ill that he could think of as likely to happen to one of my age and complexion and my symptoms since are rather mixed. Kindly let this end the water discussion for a time or take it up with the City Council, who are used to the subject.

From now on we may reasonably expect Begonia weather ,that is warmer nights and a shorter thermometer. The tuberous are growing very fast and will need shifting if in small pots, though overpotting must be avoided, it takes a large tuber to furnish an eight inch pot and a six size will do for the average. These plants are too often grown with too much or too little light, in the one case they are too shrubby in the other too weedy. The cheapest form of sheeting provides about the right shade and if they are elevated on a bench they do their best. If you can, nip off the first blooms and in any case keep off the seedpods if you want the largest flowers. It does not seem possible, but there are folks who cannot distinguish the seed making bloom, for them be it said that they are those which have back of the petals a three-winged body, and usually the blooms come in threes, the male in the center carefully guarded on each side by the females. Don't let tuberous get dry but watch that drainage is perfect. As these plants are such rank growers both in foliage and bloom, feeding is in order, every fourth watering may be with a WEAK liquid fertilizer applied when the plant is moist, never give fertilizer to a dry subject. It is only after years of learning selfrestraint in the matter of applying fertilizer, generally through the slaughter of innumerable plant victims, that one can safely be turned loose wtih any formula, and the test of safety is the lack of a need of any formula, but I am asked for mine or some other fellows every day and have finally hit upon one that is available in almost every household and that is common washing ammonia, one teaspoonful to a gallon of water. For the love of plants don't think if one teaspoonful is good two will be better, for it won't. Most people know when a plant is dry, but a lot fail to notice signs of too much moisture, suspect a surplus if leaves grow light green or yellow or if a wilting shows in the daytime obviously not from dryness or too much sun. There is another thing that must be remembered in connection with using any plant food and that is to use it only when growth is on, a dormant or sickly plant is in no condition to eat.

Just now I am having one of my periodic enthusiasms, may I never lack them, this time over Saintpaulia Ionantha, the Violet of South Africa, mine from seed sown last year are just coming into bloom and the bloom is a jewel, a royal purple wtih a golden eye the right size for a stickpin. The plants have been slow developing but that may well be my want of experience, and I have suspected that they might like a bit of lime in the soil, something we Begonia cranks avoid like the plague. Bailey says it was found growing in wooded places in fissures of limestone and granite rocks, and he also says that it owes its rather strange name to its discoverer one Saint Paul, not the one of Biblical fame but possibly a descendent. I shall try this plant in various places in the lath house, but it seems well adapted to pot culture making comparatively little root, and further its small size asks for a close approach to appreciate its beauty, probably it will do in the rock gardens that are raging just now, if in a shady situation. That reminds me that I have just seen a rock garden or rather a garden of rocks wherein varicolored rocks were planted at even spaces all over a square area. There were plants among those rocks but they looked like intruders while the rocks stood up stiff and straight and dared anyone to move any of them an inch out of line or even to put one down flat. It must have been a job to find all those rocks the same size and specification except as to color, they were extra good rocks as far as rocks go.

Bignonia Violacea has been very pleasing this season, its long streamers hanging in the lath house have been full of blooms. The foliage is very shiny and hard and rather sparse, an excellent quality for lath house

work. Where is a yellow vine for our lath houses? I know some one will say Allamanda Hendersoni, but I am not warm enough for it. The flower of Bignonia Violacea is so like a Streptocarpus bloom that I naturally come to them. The seed obtained by J. G. Morley's recommendation from Peeds of England, is now coming into bloom and is completely justifying his high enconiums of this strain, only a few of them have flowered but everyone has been different and only one has been the common purple, common only in the sense of general, there have been pink, rose, red, lavender with yellow throat, a wonderful white with red purple stripes and best of all there are hundreds yet to show. The Strepto is at its best grown cool, once established they make quick progress and want larger pots than most plants of their size they do well in the ground in lath houses and stand quite a bit of feeding.

Half the joy of a lath house is lost unless the lathhouser raises stuff from seed. To the uninitiated the process appears almost frightfully laden with responsibility, but if one has one characteristic sufficiently strong, all other qualifications follow as a matter of course, and this leading string is TO REALLY CARE. Any woman who can do fancy sewing can handle seedlings if she want to take the trouble to learn how. If it were the vogue to raise plants from seed, the seedlings would soon crowd the humans off the earth. A heap of folks start to play with seed they raise so many plants, if they raise any, that they don't know what to do with them. All commercial seed packets contain too many seeds for the general public, even when the seed is rare, so some kind of community seed raising club would seem to be necessary, each member raising just one kind and then at some kind of a get-together bean feast dividing up the spoils. Personally I don't care what is done, but I feel obligated to pass on the idea.

Don't forget the watering, make it at night now and sprinkle paths and all around.

THE INFLUENCE OF PERSONS ON PLANTS

Is not the cause of many individuals failing to grow certain individual flowers due to a lack of sympathy between the two? Perhaps "sympathy" should be substituted by the word "appreciation." It may seem rather a "tall" statement to make, when one says that a plant is capable of appreciating certain individuals more than other, yet it is not regarded as strange for individuals to have a preference for certain flowers. It is an undisputed fact that flowers, re-act to careful treatment, but two dissimilar subjects, giving the same treatment to the same kind of plant, under identical conditions, will not necessarily produce the same result. Many people merely regard a plant as something to be stuck in the ground, kept free from weeds, staked when necessary, casually admired when in bloom, but otherwise totally neglected.

One may very naturally ask one's self: "Where does the neglect come in? I follow the 'rule of thumb'; I carry out implicity all cultural directions." The question to ask, however, is: "Am I remembering that a plant is a living organism? How do I know it does not appreciate a visit from me once a day? Does it not like to be gently handled?" The idea, of course, may seem farcical in the extreme; nevertheless, making a close study of the subject, there are disclosed undoubted possibilities of a psychological understanding between plant and grower, to the mutual benefit of both.—J. Black, Beal, Northumberland, in Popular Gardening.

THE REAL GARDENER

Henri Correvon, the noted Swiss hardy plantsman, who has been lecturing at various points, was recently at Portland, Ore., and it appears that he was struck by the active interest in gardening of the men folk, compared with the Atlantic side of the continent, where women, particularly the wealthy ones, dominate the situation although they mostly employ paid experts and follow gardening on rather hackneyed lines. Evidently Herni Correvon has noted the same failings as have many others. The European who has studied the gardening of the masses is well aware that it is the male element that counts. Why this difference, because 3000 miles of water separate Europe and America, and why, after traversing another 3000 miles overland, does the male again possess the garden spirit? Is it that the men of the Eastern States haven't the instinct, or is it that they have all along been led to believe that gardening is a 'sissy's' hobby, and that the climatic conditions prevent commensurate returns for the labor it entails? It can't be the cost. In a great measure I believe the trade is responsible, and it will take more than a few years of the present style of advocacy to round up the men and convince them that it's their job, not the women's, to make the grounds around the house assume individuality. Bluntly, I feel that the average man has all along been pandered to by the commercial florist and evergreen merchant. While the European nurserymen were striving after variety and everlastingly putting these things before the public, over here very few were interested in things that called for a little study and determination. It's my idea that the average male doesn't like stereotyped things and if his interest is once aroused, he'll just go to it and grow what is supposed to be difficult. Things that are common or easy, he is apt to ignore and that's why so many of his species leave it to the women.—Forists Exchange.

THE PRUNING OF TREES AND SHRUBS

Being a Description of the Methods practised in the Royal Botanic Gardens, Kew. By W. Dallimore. (Dulau & Company, Ltd., London, 1926; 4s. 6d. net).

Although books on pruning are becoming more abundant all the time, good ones are still none too plenty, and those which outline methods actually used and found to succeed, as well as the consequences resulting therefrom, must therefore be doubly welcomed. The present volume by a well-known English authority, is a small one, and probably the advice offered will not in every respect be found adaptable to all our varying conditions in this country, but there is so much real meat in narrow compass that almost anyone, whether he be amateur gardener or park superintendent, will gain by its perusal.

One general rule emphasized is here as in England too often forgotten. "As much pruning as possible should be done whilst the branches are young and small; in fact, if all pruning could be done with the finger and thumb the results would be all the better for the plants."

As to the occasionally debated time of pruning broad-leaved trees the author states that this is both "young and old trees may be carried on during the greater part of the year, but it is not wise to prune between the period when the active movement of sap begins, during late winter and early spring and the time when the leaves are fully developed", on account of the bleeding. He believes there need be little fear of such consequences after the development of the leaves. This is, of course quite in accord wtih much orchard practice here. In pruning ornamentals we sometimes forget the admonition.

There are separate chapters on pruning young trees and old neglected ones, one on conifers, a useful discussion of the handling of street trees, a chapter on the treatment of wounds, one on hedges, and finally a comparatively detailed chapter on pruning shrubs, a long list of which alphabeticaly arranged and duly annotated as to best treatment will be for many people the most frequently consulted section of the book. The illustrations are usefully chosen and well printed.

S. S. B.

THE "ROSE ANNUAL" JUBILEE NUMBER

It is not given to many societies to celebrate a jubilee, but this year the National Rose Society is celebrating the 50th year of its unbroken progress and success. The membership has now risen to 12,520! The "Rose Annual," just published, which is edited by Mr. Courtney under the direction of the publications committee, is more comprehensive, and, we think more interesting than that of any of its predecessors.

The Bishop of Norwich has written a foreword in appreciation of Her late Majesty Queen Alexandra, who for many years took a keen and close personal interest in the Society's welfare. It was, as many remember, her practice, under the guidance of Miss Willmott, to make her way round the National Rose Show every year.

The "Rose Annual" contains interesting articles by Rev. Joseph H. Pemberton, Mrs. H.

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CHRYSANTHEMUMS

80 choice varieties of Market and Show Mums—Stanards Pompons, Anemones, and Singles, at retail, postpaid. Some of my novelties this year are—Yukon, Snow-Bound, Distinction, Oct. Rose, Bokhara and Yellow Fellow. Write for Descriptive Circular. Name this paper.

M. A. WALLACE
Rt. A., Box 397
San Fernando, Calif.

R. Darlington, W. B. Price, J. N. Hart, George M. Taylor, and many others dealing chiefly with the Rose literature of the past 50 years.

Mr. H. R. Darlington takes as a title for his review "Twelve Good Garden Roses of the Past 10 Years." These varieties selected are Miss Willmott, Mabel Morse, Mrs. Dunlop Best, Admiration, Los Angeles, Betty Uprichard, Mme. Butterfly, Mrs. Henry Morse, Mrs. Henry Bowles, Lord Charlemont, Covent Garden, and Etoile de Hollande. Colored illustrations, which in previous years have been so popular and attractive, have been extended in the present "Annual". It is announced, with much pleasure and gratification, that Her Majesty the Queen has consented to honor the Society by becoming its new Patroness.—H. C., in Gardening Illustrated.

CHRYSANTHEMUMS

Propagating Late-Flowering Varieties

The successful cultivator must make preparations for growing next year's plants actually before the old plants have finished flowering. If he is a wise cultivator he will have two batches of plants representing late-flowering sorts—one from cuttings inserted in the autumn and the other from cuttings rooted in March. The plants from the earlier batch will show flower-buds in April or May. If they do not then the tops should be pinched off to cause a break. The resultant shoots then bear the covered crown bud late in July or early in August.

Those plants, raised from cuttings inserted in March, must not be stopped. Usually, the first bud that they bear is the one to retain. It may appear as early as mid-July and be "taken" on July 20th. If the varieties are the true late-flowering ones, such as Victory, Majestic, Queen Mary, Mrs. R. C. Pulling, W. Rigby, Mrs. Gilbert Drabble, then the buds "taken" on July 20th will not be fully develveloped before October 20th to 27th—three months from date of bud-taking. The cuttings to be rooted thus early should be inserted at any time from the middle of November to the end of December. The medium early varieties should be propagated about Christmas, as the plants of these usually make natural breaks and flower on the crown bud, often showing about August 10th and being ready for taking one week later. Then we have the naturally early varieties, and cuttings of these are best rooted about the third week in January. The plants are allowed to break and bear crown buds without any stopping. They are one week, approximately, later in doing this than those classed as medium early. The blooms generally develop in a shorter time, so that all are at their best just when they are wanted—during the last week in October and the first week in November.

RAINFORD FLOWER SHOP

Cut Flowers

Floral Designs

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ELECTRICAL GIFTS

A softly shaded light for her desk—a new dresser lamp for her bedroom—the latest electric grill.

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PLANTS ON DRY LANDS

By Harry Johnson.

Continued from April Number

The associations found in sphagnum bogs are very local and peculiar. Many hardy orchids find congenial quarters, so also do the pitcher plants, Venus flytrap and sundew. The number of species frequenting these bogs are few and generally highly specialized. The genera mentioned are insectivorous and eke out their scanty nitrogen ration with captured prey. The limiting growth factors seem to be the extreme coldness of the stagnant bog water held in the carpet of moss, and the presence of acids absorbed from the peat.

Let us now consider the types of climate which lend to xerophitic modifications and which act over broader areas than do the factors which we have just seen. They may be classified as follows:

1. Those with low winter temperatures.
2. Those with temporary and periodic rainfall.
3. Those with protracted droughts.

Two types of vegetation differing decidedly in character are found in such climates. That one which occurs where winter temperatures are low may be composed of typically moist region plants, such as we find in New England, yet at one season it exhibits a very decided adaptation to physiological drought. The floras occurring within the areas defined by the last two groups are the ones generally thought of when xerophytes are in question.

The flora of cold regions shows very decided peculiarities in common with that of dry regions. During the winter the soil may be very cold or even frozen to a depth of many feet, thus slowing down or stopping altogether the absorption of water. Atmospheric conditions fluctuate erratically; dry winds, warm sunshine, freezings and thawings may follow one another in rapid sequence and exact from the plant a dangerous toll of moisture. To meet these adverse and trying changes most northern plants have developed the habit of retreating into winter quarters underground or at least shedding their leaves. Analogous climatic factors have brought into existence the summer deciduous condition and the bulbous and tuberous habit of many familiar California plants. The fall of leaves in autumn is a comparatively recent innovation. The ancestors of our present day plants were all evergreen, the climate of our earth throughout the greater part of its existence being uniformly warm even to the poles. The winter disposal of the leaves allows the plant to develop to the fullest a type of foliage suited to take complete advantage of the long favorable growing season, and yet at the same time to get rid of these dangerous evaporation surfaces during the time of drought.

Regions of periodic rainfall cover great areas of the earth's surface, particularly in the sub-tropical zones. By periodic rainfall is meant a precipitation, copious or otherwise, during a well-marked rainy season, followed by a dry period. Such conditions are found in the southwestern United States, the plateaus of Mexico, Chile, parts of Brazil, the Mediterranean region, Arabia, Australia, South Africa, Mongolia, etc. In these regions, and largely confined to the sub-tropical areas, grow the succulents so admired by fanciers. In places where the rainfall is sufficient—and this is usually in the mountains—thin forests, mainly composed of cone bearing trees, may exist. In general, however, the growth is characterized by a predominance of shrubs and herbs, many of the latter being annuals. Such associations cover immense areas in California, Australia, the Mediterranean region and South Africa. Their plants all show certain features in common, characteristic of which are the small and leathery leaves. Such shrubby associations, variously called chapparal, macchie, and bush, generally form close and impenetrable stands. Many of the species are spiny like certain of the acacias and ceanothi. Others have strong odors produced by a copious secretion of ethereal oils. The characteristic odors of sagebrush and black sage are familiar to most of us. The constant grey-green of the foliage is another most obvious and common feature and is always a cause of comment to those not familiar with such vegetation.

The essential difference between regions of protracted drought and regions of rainfall periodically is in the more erratic and less sufficient precipitation. As a consequence the flora shows a more extreme and specialized character. The deserts which are defined within these areas are well scattered over the globe. Great sections of the United States following the Rockies north almost into Canada and south far into Mexico, are desert. Areas in South America, the central basin of Australia, parts of Mongolia, Arabia, northern Africa, the Kalihari region of south central Africa and smaller localized areas throughout the world may also be so designated. The nature of the vegetation is highly characteristic, its extreme specialization setting it quite generally apart from other floras. Practically the only tree-like growths in the extreme American deserts are the arborescent cacti and yuccas. In Africa somewhat the same feature is supplied by the candalabra-like euphorbias and aloes. Plant growth is scattered, sparse, and

inclined to take on procumbent or tufted habits. Annuals, though often plentiful, are ephemeral. Plants with a rosette habit are frequent. The leaves of all species are leathery and much reduced.

Such are a few of the varied xerophitic habitats which exert such profound effects on plants.

Let us look more closely at the plants themselves and particularly at the responses which have been evoked by life under such austere conditions.

Practically every part of the normal plant form has been subject to modification. Roots, stem, leaves, reproductive system, and all their parts are involved in the changes, while the deciduous and annual habits have been utilized or even, perhaps, called into being. Seldom is a plant modified in one particular only, since variations frequently need the support of other parts to be effective. Thus in agave, the rosette habit, heavy cuticle, sunken stomata, armed leaf, excess water deeply penetrating roots, and flower shoot vivipary, are modifications each of which is a unit in a general plan of conservation.

To make possible a condensed account of the protective devices it is necessary to separate them as though they existed apart from one another. It should be kept in mind that to properly appreciate their respective values they must be visualised as parts of a cooperative and harmonious system.

Plants possessing the deciduous habit may be divided into two groups: those in which low winter temperature is the stimulus to leaf fall, and those in which high temperature and lack of moisture produce a like result. To the first group belong plants of the cold temperate and frigid zones where the deciduous habit is universal. Though moisture may be plentiful, cold weather greatly slows up the life processes and where the soil is frozen, practically stops root absorption. Thus the great exposure of transpiring surface presented by the large leaves would soon deplete the store of water contained within the plant. Quite possibly other factors enter into the winter fall of leaves but perhaps the most important is this one of which we have spoken.

The summer deciduous habit reaches its greatest development in the deserts but is frequent in regions of periodic rainfall also. After the growth incited by the rainy season ceases, the lack of moisture sends the plants into a dormant phase. The various cell activities are reduced to a minimum, food is withdrawn from the leaf, and a corky abciss layer is formed across the leaf stalk, followed by defoliation. During the late spring our chapparal covered hills become yellowish for a week or so while the leaves are preparing to fall. Most of the evergreen species are partially summer deciduous, the older worn-out foliage dropping as the wilting stage is approached.

A recent specialization among flowering plants is the development of the annual habit. In this case the plant survives the inclement period as a resting embryo in the seed. Resting or dormant tissue has a far greater range of temperature resistance than has active tissue, and correlated with this is a similar greater resistance of dry tissue than of moist tissue. It would appear that the steady increase in the number of manual species, particularly among the more highly specialized families such as the **Compositae** among the dicotyledons and the **Gramineae** among the monocotyledons, must eventually solve the drought problem in a quite satisfactory manner. In this way the elaborate structures necessary to the survival of perennials may be dispensed with and the energy thus conserved may be expended in the production of seed.

A great number of herbaceous plants retreat beneath the soil at the approach of winter or of the dry season. Thus they are insulated from the fluctuations of the atmosphere and are reasonably safe from dessication. Some method of storing food must be provided, however, to allow of quick growth on renaissance. Various structures have been modified to provide such reservoirs of food and water; they are developed at various depths beneath the surface and are protected in various ways from drying out and from the attacks of animals. Such are bulbs—storage in leaves; rhizomes, corms and tubers—storage in stems; root-tubers—storage in roots. The annual loss of the aerial stem seems to be but an extension of the deciduous habit extended to all the aerial parts.

A reduction of leaf surface is perhaps the most characteristic and general feature exhibited by xerophytes. In a few cases the leaves are dissected or compound; in others the numbers are greatly reduced. Again the expanded area may be very small. So general is this type that a dry regional flora is quite generally termed microphyllous or small leaved. Reduction may proceed to such a degree that the leaf becomes converted to a scale, or, as is in the broom and various euphorbias, is evanescent, dropping almost as soon as formed. When the modification proceeds to such an extreme as to render the leaf non-functional as regards food manufacure, then some other portion of the plant must take over the work. In the acacias the blade is lost while the petiole, flattened and widened, carries on the work of starch-making. In the cacti, brooms and our native **Parkinsonia** the work is performed by the branches which have become green to serve the purpose.

To be concluded.

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